

# ON THE FRUIT-FLIES OF THE GENUS *DACUS* (s.l.) OCCURRING IN INDIA, BURMA, AND CEYLON.

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As stated in my previous paper\* on the Ethiopian species of *Dacus*, the Oriental forms of this genus show much more variation in their structural and ornamental features. They may be therefore divided into no less than five well defined genera, only one of which is common to both faunal areas. Reserving for later publication a third paper on the Oriental (and Australian) species, I will give here some notes on the classification and feeding habits of the species from British India.

Since the publication in 1913 of my paper on the Indian Trypanoids,† I have received from various sources a large amount of material, which enables me to give a better definition of the species and to add much information as to fruits on which they feed. The material was received :—(a) from the Imperial Bureau of Entomology ; (b) from the Indian Museum, Calcutta ; (c) from the Pusa Agricultural Research Institute, forwarded by the Imperial Entomologist, Mr. T. B. Fletcher, who has supplied the data as to the host fruits ; (d) from the Dehra Dun Forest Research Institute, forwarded by Professor A. D. Imms ; (e) from Professor L. Petri of Rome, material bred at Peradeniya, Ceylon, by Mr. E. E. Green ; (f) from Professor E. Bugnion, of Lausanne, material collected by him in Ceylon.

The fruit-flies which are grouped around *Dacus* are principally distinguished from other Trypanoids by their reduced chaetotaxy, as established by me and accepted by Professor Hendel in his synopsis of the genera of the family.‡ This reduction consists in the *simultaneous* disappearance of the following macrochaetae :—ocellar, post-vertical, humeral, praesutural, dorso-central and sternopleural ; usually the bristles of the occipital row and those on the under side of the front femora are also wanting or much reduced. There are no other genera of fruit-flies in which all these bristles are wanting *at the same time*, except a few Oriental genera in which this is the case, though they have not a *Dacus*-like appearance. They must however be associated with the true *DACINAE*, and they constitute another peculiarity of the Oriental fauna as compared with that of the Ethiopian region.

The following is a table of the Oriental and Australian genera of *DACINAE* at present known :—

1 (12). Arista bare ; scutellum broader than long, rounded, convex above, not carinate at the sides ; abdomen not linear, usually broader than the thorax ; wings

\*Bull. Ent. Research, vi, September, 1915, pp. 85–101, 14 figs.

†Indian Trypanoids (Fruit-flies) in the Collection of the Indian Museum, Calcutta. *Memoirs of the Indian Museum*, iii, No. 3, May 1913, pp. 51–175, pl. viii-x.

‡Die Gattungen der Bohrfliegen ; analytische übersicht aller bisher bekannten Gattungen der Tephritinae. *Wien. entom. Zeitung*, xxxiii, April 1914, pp. 73–98.

with the first three longitudinal veins closely approximated, the anterior cross-vein long and oblique, the second basal cell dilated and the anal cell drawn out into a very long point.

2 (7). Antennae as long as or shorter than the face, with the first joint not elongated and shorter than the second ; face hollowed in the middle ; abdomen never stalked, though sometimes a little constricted at base ; second basal cell short, usually not more than twice as long as broad.

3 (4). Thorax without anterior supra-alar or praescutellar bristles ; wings of the male without the supernumerary lobe at end of anal vein . . . *Dacus*, F. (s. str.).

4 (3). Thorax with well developed anterior supra-alar and praescutellar bristles ; wings of male usually with supernumerary lobe at end of anal vein.

5 (6). Wings banded . . . . . *Bactrocera*, Guér.

6 (5). Wings not banded . . . . . *Chaetodacus*, Bezzi.

7 (2). Antennae much longer than the face, with the first joint usually elongated and as long as the second ; face not hollowed, usually flat or even convex ; abdomen distinctly stalked, club-shaped ; thorax without praescutellar bristles ; wings with the second basal cell more elongate, many times longer than broad, and without supernumerary lobe in the male.

8 (11). The basal joints of antennae wholly separated.

9 (10). Face flat ; thorax with the transverse suture broadly interrupted in the middle and without unpaired acrostichal bristles ; front femora not spinose beneath ; second portion of fourth longitudinal vein straight, the discoidal cell less narrowed at base . . . . . *Mellesis*, gen. nov.

10 (9). Face distinctly convex ; thorax with the transverse suture not interrupted, and often with a strong acrostichal bristle on the middle line ; front femora with some spines beneath near the apex ; second portion of fourth vein deeply sinuose, the discoidal cell much narrowed in its basal half . . . *Monacrostichus*, Bezzi.

11 (8). Basal joints of antennae united in the shape of a common petiole  
*Callantra*, Walker.

12 (1). Arista short plumose ; scutellum longer than broad, triangular, flat above, distinctly carinate at the sides ; thorax without praescutellar bristles ; abdomen linear, narrower than the thorax ; middle femora elongated and thickened ; wings with the first three veins not approximated, the anterior cross-vein short and placed perpendicularly, the second basal cell not dilated and the anal cell with a short point.

13 (14). Femora not spinose beneath ; thoracic suture interrupted in the middle ; ovipositor compressed ; antennae short . . . . . *Neosophira*, Hendel.

14 (13). Femora spinose beneath ; thoracic suture complete.

15 (16). Antennae shorter than the face, pendulous ; thorax with anterior supra-alar bristle ; scutellum with four bristles ; ovipositor conical. . . *Adrama*, Walker.

16 (15). Antennae very long, porrect, twice as long as the face ; no anterior supra-alar bristles and only one pair of scutellar bristles ; ovipositor compressed  
*Meracanthomyia*, Hendel.

## i. DACUS, F.

1. **Dacus (Leptoxyda) longistylus**, Wied. (1838).

Bezzi, Bull. Ent. Res., v, 1914, p. 154, and vi, 1915, p. 99.

Some specimens of both sexes in the Indian Museum from Balighai, near Puri, Orissa, 16-20.viii.1911 (*N. Annandale* and *F. H. Gravely*), and some others from Coimbatore, vi.x.1913, on *Calotropis* (*T. B. Fletcher*); Nagpur, 9.iv.1914, on *Calotropis*.

No doubt this is the same as the African species which lives on the same plant (*Calotropis procera*), and which was doubtfully recorded by me in 1913 from Karachi. The Indian specimens before me are very like those from Egypt and equally small, while the specimens from Abyssinia and Senegal are more robust and of much larger size. The ovipositor is also proportionally shorter in the smaller Egyptian and Indian form.

2. **Dacus brevistylus**, Bezzi (1908).

Bezzi, Bull. Ent. Res., v, 1914, p. 154, and vi, 1915, p. 100.

Some specimens of both sexes from Hagari, v.1908, in watermelon (*E. Ballard*); Siddhout, Cuddappale, Madras, iv. 1910, in melon; Coimbatore, 26.iv.1912, in melon (*T. B. Fletcher*).

This is the well-known Ethiopian species that attacks melons and other cultivated Cucurbitaceae. Some specimens have the thoracic markings and the scutellum of a reddish instead of a yellow colour; a single specimen shows a double hypopleural spot, thus forming a link with *D. vertebratus*, Bezzi.

*Note*.—Of other Oriental or Australian species belonging to the genus *Dacus* (*s. str.*), I know only *D. cucumis*, French (1907), from Queensland, which has, however, four scutellar bristles, a thing which has never been observed in any Ethiopian species of the genus.

## ii. BACTROCERA, Guér. (1832).

No species of this genus is at present known from the Indian fauna; besides the typical species *umbrosa*, F., it seems that *frauenfeldi*, Schiner, *frenchi*, Froggatt, and *albistrigata*, Meij., also belong here.

## iii. CHAETODACUS, Bezzi. (1913).

In my paper of 1913 nine forms of this group were distinguished, but the distinctions were based on very scanty material; at present I have before me many hundreds of specimens, and I am able to give a better revision. Some species seem to be very variable in the colouring of the body and wings, as is shown by the bred material of *ferrugineus* and *cucurbitae*; the fuscous punctuation of the frons and the black pattern on the thorax and abdomen seem to be chiefly subject to variation. The studies of Prof. Berlese on *D. oleae* (*Redia*, iv, 1906, pp. 5-7, fig. 4) also confirm the great variability of the thoracic and abdominal markings in the present genus. I think therefore that Prof. Hendel\* has described some forms which must be considered only as varieties, and I have made here an attempt to differentiate the various forms into which the typical *D. ferrugineus* may be divided.

\*F. Hendel. Genus *Dacus*, Fabricius (1805) (Dipt.). *Supplem. Entomolog.*, No. 1, August 1912, pp. 13-24, pl. 1.  
(C288)

I have also corrected my previous error concerning the interpretation of *zonatus*, *mangiferae* and *persicae*, after seeing typical specimens of this last species. Finally I have added six new species, one of which has already been described,\* and another known hitherto only from Sumatra.

The Indian species can now be distinguished as follows :—

1 (22). Scutellum with a single pair of bristles, the apical one.

2 (17). Two pairs of lower fronto-orbital bristles.

3 (16). Vertical, thoracic and scutellar bristles yellow; face always with black spots; thorax without yellow middle stripe; third abdominal segment of male ciliated; wings without dark spot on hind cross-vein.

4 (9). Wings with well developed brown anal stripe and with complete brown fore border; first basal cell microscopically pubescent in the portion over the second basal cell; fore and hind tibiae blackened.

5 (8). Thorax reddish on the disk, with or without black markings; pleurae reddish, the yellowish mesopleural stripe being sometimes margined with black; mesophragma reddish or partly black; ovipositor reddish; coxae of all the legs reddish; scutellum not spotted; occiput reddish.

6 (7). Back, pleurae and mesophragma altogether reddish, sometimes with a black border on front side of mesopleural stripe; frontal spots less distinct

3. *ferrugineus*, F.

7 (6). Back black, but reddish around the humeral calli, on the borders of the suture and before scutellum; mesopleural stripe always margined with black on both sides; mesophragma blackish on the sides .. 4. *ferrugineus dorsalis*, Hend.

8 (5). Thorax, pleurae and mesophragma entirely black, with the usual yellow markings; ovipositor black; hind coxae and trochanters black; a distinct darkish spot at end of the scutellum .. .. 5. *ferrugineus incisus*, Walk.

9 (4). Anal stripe not distinct; brown fore border incomplete; first basal cell wholly hyaline.

10 (11). Scutellum of a pellucid brownish colour, with two more or less distinct basal yellow spots; brown fore border usually indistinct, and apical brown spot wanting; facial black spots broad; fore and hind tibiae blackened; species of greater size .. .. 6. *ferrugineus versicolor*, var. n.

11 (10). Scutellum altogether yellow; wings with an isolated apical brown spot; facial spots smaller; fore tibiae yellow; hind tibiae yellow, at least in middle; species of smaller size.

12 (13). Thorax entirely reddish, with the usual yellow markings and the mesopleural stripe rarely margined with black; facial black spots of rounded shape, isolated; ovipositor red, with black end .. .. 7. *zonatus*, Saund.

13 (12). Thorax mainly black on disk and pleurae with the usual yellow markings.

14 (15). Facial black spots separated and rather broad; abdomen of male entirely black behind the second segment; legs with the coxae entirely yellow .. .. 8. *tuberculatus*, sp. n.

\*M. Bezzi. Two new species of Fruit-flies from Southern India. *Bull. Ent. Res.*, v, September 1914, pp. 153-154.



15 (14). Facial spots more or less united together towards the middle, forming a transverse band; abdomen of male reddish behind the middle, with a black longitudinal middle stripe; ovipositor red . . . . . 9. *correctus*, nom. n.

16 (3). Vertical, thoracic and scutellar bristles black; face of male immaculate; thorax with a middle longitudinal yellow stripe; third abdominal segment of male not ciliated; ovipositor very long and thin, black; wings with a distinct brown spot at lower end of hind cross-vein . . . . . 11. *diversus*, Coq.

17 (2). Three pairs of lower fronto-orbital bristles, the two apical pairs being closely approximated; all the bristles of head and thorax black.

18 (19). Reddish species, with entirely yellow scutellum and a middle yellow stripe on thorax; femora entirely yellow; wings with the hind cross-vein broadly infuscated and with very broad anal stripe . . . . . 14. *cucurbitae*, Coq.

19 (18). Blackish species, with black or black-spotted scutellum; femora partly black; wings with the hind cross-vein not infuscated.

20 (21). Scutellum yellow, with a black terminal spot; thorax with a middle yellow stripe; wings with well developed anal streak . . . . . 17. *scutellarius*, sp. n.

21 (20). Scutellum black, with a small yellow spot on each side; no yellow middle stripe on thorax; wings without anal stripe . . . . . 18. *biguttatus*, sp. n.

22 (1). Scutellum with two pairs of bristles, the basal and the apical; all the bristles of the body black.

23 (30). Only two pairs of lower fronto-orbital bristles.

24 (25). Wings absolutely without any brown marking at apex or even on anal vein, and without the supernumerary lobe in the male; face altogether black; scutellum black, with two broad yellow spots; third abdominal segment of male ciliated . . . . . 19. *bipustulatus*, Bezzi.

25 (24). Wings with distinct brown pattern and well developed anal stripe; face yellow, with black bands or black spots; scutellum entirely yellow, immaculate.

26 (27). Thorax reddish; face with black spots; third abdominal segment of male not ciliated; wings without supernumerary lobe in the male, and with the angle at end of anal cell of equal size in both sexes . . . . . 16. *garcinia*, Bezzi.

27 (26). Thorax black; third abdominal segment of male ciliated; wings of male with distinct anal lobe and with the usual sexual dimorphism of anal cell.

28 (29). Face in both sexes with two parallel transverse black bands; thorax without middle yellow stripe . . . . . 10. *duplicatus*, sp. n.

29 (28). Face with the two usual black spots; thorax with middle yellow stripe . . . . . 13. *hageni*, Meij.

30 (23). Three pairs of lower fronto-orbital bristles; yellow middle stripe of thorax always present; males always with ciliated third abdominal segment and with supernumerary anal lobe to the wings.

31 (34). Scutellum entirely yellow, without any definite black apical spot, or with a less distinct brownish one.

32 (33). Face with two black spots; femora yellow; wings with the brown fore border dilated into a broad spot at end, and with the hind cross-vein lightly margined with fuscous at lower end . . . . . 15. *caudatus*, F.

33 (32). Face in both sexes with a middle black cross band; femora black at end; wings without broad apical spot and with the hind cross-vein not shaded below .. .. . 12. *maculipennis*, Dol.

34 (31). Scutellum with a definite black spot at end; black species, with partly black femora; wings with an isolated black spot at end .. 20. *scutellaris*, Bezzi.

### 3. *Chaetodacus ferrugineus*, F. (1794).

*Bactrocera ferruginea*, Bezzi, Mem. Ind. Mus., iii, 1913, p. 95, pl. viii, fig. 5.

Taking as the main character for this species the yellow bristles of the head, thorax and scutellum, I will assume for typical specimens those which show a complete reddish coloration of the body, without any black pattern on the disk of the mesonotum, and with a black margination of the mesopleural stripe, or with a faint one on the anterior side alone. The frontal dark spots are wanting or less developed; the facial black spots are very broad; the pteropleural bristle is weak; the occiput is red with a yellow border. The white-dusted band of the hind border of the second abdominal segment is less distinct.

Thus defined, *C. ferrugineus* (s. str.) is easily recognisable, but it is impossible to take as the principal character that of the unspotted frons, as is done by Hendel (Suppl. Entom., i, 1912, p. 20); immature specimens have an entirely reddish frons, while in mature specimens there are more or less distinct central and lateral dark spots.

In my above-quoted paper of 1913, under the name of *ferruginea* are comprised the present and the following three forms (*dorsalis*, *incisus* and *versicolor*); they may be considered as varieties of a single species, inasmuch as all are to be found living at the same time in the same fruits.

I have seen specimens from Peradeniya, Ceylon (*Prof. Bugnion*); from Katihar, Purneah Distr., N. Bengal, v. 1910 (*Paiva*); from Pusa, Bihar, April to July, bred from guava (*Psidium guajava*) and loquat (*Eriobotrya japonica*) fruits, together with the form *versicolor*, which is hardly distinguishable, the scutellar coloration being often faintly indicated and the wing characters being fully developed only in mature specimens; from Mandalay, on mango (*Mangifera indica*) vi. 1912 (*K. D. Shroff*); from Myit-Kyina, Upper Burma, in peach (*Prunus persica*) and in pomelo (*Citrus decumana*) fruits, June and September (*T. B. Fletcher*); from Maymyo, 3,500 ft., Upper Burma, v. 1909, larva in mango (*K. D. Shroff*).

### 4. *Chaetodacus ferrugineus dorsalis*, Hendel (1912).

*Dacus dorsalis*, Hendel, Suppl. Entom., i, 1912, p. 18, pl. 1, fig. 3.

Most specimens referred by me to *ferrugineus* in 1913 belong to the present form, described originally from Formosa. It may be distinguished from the preceding form by the characters given in the table; the occiput is red, with dark spots.

There are before me specimens from Peradeniya, Ceylon (*E. E. Green*); Pusa, Bihar, 16. iv. 1914, in loquat (*Eriobotrya japonica*) (*T. B. Fletcher*); Coimbatore, South India, on mango (*Mangifera indica*) 16. vii. 1913 (*T. B. Fletcher*); Taru, Peshawar Dist., bred from peach (*Prunus persica*), viii.-ix. 1914 (*T. B. Fletcher*); Mandalay, in mango and in chilly (*Capsicum frutescens*), 22. vi. 1912 (*K. D. Shroff*); Myit-Kyina, Upper Burma, in pomelo (*Citrus decumana*), 13. ix. 1914, and in guava

(*Psidium guyava*), 1.x.1914 (*T. B. Fletcher*); Lashio, 3,000 ft., and Tatkon, U. Burma, in *Solanum verbascifolium*, 6-7.ix.1914 (*T. B. Fletcher*); Maymyo, 3,500 ft., Upper Burma, in American chillies (*Capsicum sp.*), in pear (*Pyrus communis*) and in peach (*T. B. Fletcher*).

5. ***Chaetodacus ferrugineus incisus***, Walker (1860).

This is a very common Indian form, distinguished by the prevalent black colour of the entire body; the legs are also in great part black; the frontal spots are much developed and much darker than usual. The spot at the end of the scutellum is not defined, but in certain lights is rather distinct and pellucid. The puparium of this form is of a straw-yellow colour, rather shining, with the stigmatic plates approximated and with less distinct segmentation.

I have seen a great many specimens from the following localities:—Kumaon, 10.i.1912 (*Prof. A. D. Imms*); Pollibetta, South Coorg, from jak fruit (*Artocarpus integrifolia*), 15-26.v.1914 (*T. B. Fletcher*); Santikoppa, North Coorg, from fruits of *Careya arborea*, 4-10.v.1914 (*T. B. Fletcher*); Bangalore, 3,000 ft., on mango leaves, 8.v.1913, and on guava fruits (*Psidium guyava*), 27.x.1907 (*T. B. Fletcher*); Coimbatore, attacking mango fruits (*Mangifera indica*); Tatkon, Upper Burma, in *Solanum verbascifolium*, 6-7.ix.1914, Lashio, 3,000 ft., on same plant, viii.1914, and Taung-gyi, 1.iii.1910 (*T. B. Fletcher*).

6. ***Chaetodacus ferrugineus versicolor***, var. nov.

♂ ♀. Length of body, 5.5-6.5 mm. Very like typical *ferrugineus*, but at once distinguished by the coloration of the scutellum; this is darkened in the middle and at the end, and bears two broad yellowish spots, one on each side, but this coloration is sometimes faintly developed, the scutellum being pellucid, perhaps as a result of immaturity. The punctuation of the frons is mostly not distinct; the thorax is entirely of a reddish colour, only the yellow mesopleural stripe being narrowly margined with black; the femora are yellow; in the wings the dark costal border is not complete, and even sometimes wanting, the first basal cell is entirely hyaline, and the anal stripe is not distinct.

The sexual characters of the male in the wing are the same as in *ferrugineus*.

Peradeniya, Ceylon (*E. E. Green*); Pusa, Bihar, on guava and sapodilla (*Achras sapota*) fruits, vi-vii.1914 (*T. B. Fletcher*); Coimbatore, in mango (*Mangifera indica*) fruits, vii.1913 (*T. B. Fletcher*).

7. ***Chaetodacus zonatus***, W. W. Saunders (1841).

The following are synonyms of this species:—*squalidus*, Walker (1860); *persicae*, Bigot (1889); *mangiferae*, Cotes (1893), and Bezzi (1913).

In my paper of 1913 I have distinguished *zonatus* (with the synonym *persicae*) from *mangiferae*, which I considered to be a variety of *ferrugineus*. Now, after comparison of the types of *persicae*, Bigot, with those of *mangiferae*, Cotes, I have come to the conclusion that they must be referred to the same species; and as Saunders figures his *zonatus* as having an entirely reddish thorax, both the above-quoted names must be referred to it. *C. squalidus*, Walker, is evidently the same species, which is common in India, and very injurious to peach, mango and a number of other fruits.

The species which I have in 1913 interpreted as *zonatus* must be renamed, and I propose for it the name of *correctus*, n. n. The true *zonatus*, as here defined, is very like typical *ferrugineus* and probably only a variety of it, being distinguished by the different wing pattern. The wings have no dark costal border, but only a well defined, isolated black spot at the end; the first basal cell is altogether hyaline; the anal dark streak is wanting. Wing characters of male as in *ferruginetus*. Very characteristic for the species is the white-dusted band at the hind border of the second abdominal segment. The frontal spots are not distinct, and the facial black spots are much smaller than those of *ferrugineus*.

I have seen some specimens of the present species which show an abnormal tendency to have three or four scutellar bristles, but it is interesting to note that these supernumerary bristles are always apical, not basal.

I have seen numerous specimens, including paratypes of *Rivellia persicae*, Bigot, in the Indian Museum, labelled "the Ranchi peach-pest"; Pusa, Bihar, on peach (*Prunus persica*), vi. 1914, on fig (*Ficus* sp. cultivated), iv. 1914, on sapodilla (*Achras sapota*), vii. 1914, and from ripe Bael fruit (*Aegle marmelos*), viii. 1914 (*T. B. Fletcher*); Santikoppa, North Coorg, from fruits of *Careya arborea*, v. 1914 (*T. B. Fletcher*); Amnoha, Moradabad, on mango fruits, vi. 1914 (*T. B. Fletcher*); Pachmarhi, 3,500 ft., Central India, in peach fruits, vi. vii. 1913, and Nagpur, in white gourd (*Lagenaria vulgaris*), viii. 1913 (*Ratiram*); Taru, Peshawar Dist., bred from peach, viii-ix. 1914 (*T. B. Fletcher*).

#### 8. *Chaetodacus tuberculatus*, sp. nov.

The present species takes an intermediate position between the preceding, with which it has in common the two separated facial black spots, and the following one, with which it corresponds in the colour of the body. Eminently characteristic of it are the wholly yellow hind tibiae, which have a strong tubercle on the outside, before the end.

♂. Length of body, 6 mm.

Head as in *correctus*, with the same yellow bristles and only two pairs of lower fronto-orbitals, but the facial black spots are rather broad, rounded or ovate, larger than in *zonatus*, but not at all concurrent towards the middle; frontal dark markings less distinct. Thorax wholly black, also on the pleurae and on the breast; on the back it is greyish dusted, and around the humeral calli it is a little reddish; besides there are the following yellow markings:—humeral calli, a streak on each side behind the suture, a broad mesopleural band encroaching above on the sutural callus and prolonged below with a spot on the sternopleura, and two contiguous hypopleural spots. Scutellum entirely yellow, with narrow black base; mesophragma black, with a dark reddish, longitudinal middle stripe. Halteres pale yellow. Thoracic and scutellar bristles of a dark yellow colour, the scapular well developed, the anterior supra-alar strong, the pteropleural weak. Abdomen black, minutely punctulate, with short grey pubescence; third segment with black cilia; first and second segment more or less yellowish on the posterior half, and therefore at the base of the abdomen there is a more or less broad transverse yellow band, divided into two parts by a black transverse line, the posterior part being a little whitish. Venter and genitalia black. Legs rather short and stout, entirely yellow, even on the coxae,



with short yellowish pubescence; apical spur of middle tibiae black; pre-apical tubercle of hind tibiae very prominent; tarsi distinctly broadened at the end, with the basal joints not whitish. Wings hyaline, with yellowish veins, without a dark costal border, only the stigma being honey-yellow; a faint dark spot at the end of the third vein, often very little developed; last portion of fourth longitudinal vein curved at the base; first basal cell wholly hyaline, even in the narrowed part above the dilatation of the second basal cell; anal streak wanting, the point of the anal cell being only of a honey-yellow colour, like the stigma, but with a broad dark spot at the end; supernumerary lobe at the end of the anal vein well developed.

Type ♂ (British Museum) and some additional specimens of the same sex from Taung-gyi, 4,000 ft., and Myitkyima, Southern Shan States, in peach (*Prunus persica*), May to June (*T. B. Fletcher*).

9. ***Chaetodacus correctus***, nom. nov.

*Bactrocera zonata*, Bezzi (*nec* W. W. Saunders), Mem. Ind. Mus., iii, 1913, p. 94, pl. viii, fig. 4.

Very near the true *zonatus*, but distinguished by the colour of the thorax, and chiefly by the facial black spots being united together to form a black transverse band. The whitish cross-band on the second abdominal segment is less developed. The hind tibiae of the male are distinctly tuberculate before the end.

This little species lives in company with the two preceding ones, feeding on the same fruits; it shows also some affinity with the following, *diversus*, Coq., but differs from it in many points of structure and coloration, which render impossible the suppositions advanced by Howlett in his interesting studies on the effects of citronella oil.\* On the other hand, it is quite possible that *zonatus*, *tuberculatus* and *correctus*, all feeding on peach and all possessing the peculiar tubercle on the hind tibiae of male, are only different forms of a single species; but while *zonatus* and *correctus* are Indian, *tuberculatus* is found only in Burma.

The puparium of the present species is of a rather dark, shining yellow colour.

Pusa, Bihar, from peach (*Prunus persica*), 25.vi.1914 (*T. B. Fletcher*); Coimbatore, on mango (*Mangifera indica*), v.viii.1913 (*T. B. Fletcher*); Guindy, Madras, 16-21.viii.1913, "attracted to opened termitarium" (*T. B. Fletcher*); Hagari, Bellary District, Madras, on castor leaf, 14.viii.1909.

10. ***Chaetodacus duplicatus***, sp. nov.

A rather small black species, very near the following, but distinguished by the four scutellar bristles and by the ciliated third abdominal segment of the male, and further differing from any other species recorded here on account of the double black facial band in both sexes.

♂ ♀. Length of body, 5-6 mm., with the ovipositor.

Head yellow, with striking black markings; occiput black, with a yellow border near the eyes, which becomes broader below; frons with a middle dark spot, a black ocellar dot, black lunula and three pairs of rather broad and well-defined black lateral spots; face shining, with two narrow, parallel, black cross-bands, the first a little

\*Trans. Ent. Soc., London, 1912, pp. 412-418, pl. xxxix-x<sup>l</sup>.

below the base of the antennae, the second a little above the oral border; this latter band is placed in a furrow, and is often interrupted in the middle; dark subocular spot distinct; palpi pale yellowish; antennae entirely reddish yellow. Cephalic bristles black; only two pairs of lower fronto-orbitals present. Thorax entirely black, even on the pleura and breast, but clothed on the back with greyish pubescence; it bears the following bright yellow, very striking markings:—humeral calli, a streak on each side behind the suture, a broad mesopleural stripe united above with a very small sutural callus and below with a broad sternopleural spot, and two contiguous hypopleural spots. Scutellum entirely yellow; mesophragma entirely black. All the macrochaetae black; anterior supra-alar well developed; basal scutellar only a little weaker than the apical ones. Halteres whitish yellow. Abdomen rounded, punctulate, with short grey pubescence; third segment in the male with well developed black cilia; first segment with a narrow yellow hind border; second yellow, with a black basal band, which sometimes does not reach the sides; third and fourth entirely black; fifth yellow, with more or less distinct basal and middle longitudinal bands; ovipositor yellow, flattened, if exerted as long as the two last abdominal segments together; male genitalia brown; venter yellow, more or less darkened. Legs yellowish, with white hind praetarsi; coxae yellow; the four posterior femora with the tips dark brown; hind tibiae of male tuberculate, darkened at both ends or wholly blackish; last tarsal joints darkened. Wings hyaline, with dark yellow veins; male with the brown spot at the end of the anal vein and with the supernumerary lobe well developed, but less so than in *diversus*; no brown fore border and no distinct anal streak; only the stigma blackish brown, the subcostal cell yellowish brown at the end, and a well developed elongate brown spot at the end of the third vein; first basal cell wholly hyaline at the base; terminal portion of fourth vein curved at the base; no brown spot at the lower end of the hind cross-vein.

Type ♂ and type ♀ (British Museum) and some additional specimens of both sexes from Pachmarhi, 3,500 ft., Central India, on peach (*Prunus persica*), 30.v.1909 (*Ratiram*).

The present species belongs evidently to the group of *zonatus*, *tuberculatus* and *correctus*, feeding also on peach.

#### 11. *Chaetodacus diversus*, Coq. (1904).

*Bactrocera diversa*, Bezzi, Mem. Ind. Mus., iii, 1913, p. 94, pl. viii, figs. 2-3.

*Dacus* sp., H. M. Lefroy, Indian Insect Life, 1909, pl. lxvi, fig. 2.

A very distinct species, the male of which has a non-ciliated third abdominal segment, but a very exaggerated supernumerary lobe at the end of the anal vein in the wings. The ovipositor is much longer than in the other species, very like that of *D. longistylus*; but in immature specimens it is flattened and apparently shorter. The facial band of the female is simple, not double as stated in my paper, probably as a result of confusion with *duplicatus*. The wing figures of pl. viii are those of the male (fig. 2) and female (fig. 3).

The puparium of this species is more whitish than that figured by Prof. Lefroy. The species was originally bred from oranges (*Citrus aurantium*). Pusa, Bihar, sitting on jaman leaves (*Eugenia jambolana*), 23.vi.1914, and on mustard, 27.i.1914

(*T. B. Fletcher*); Bangalore, on mango leaves, v. 1913 (*T. B. Fletcher*); Machavaram, Godavari Dist., 26.xii.1913 (*T. B. Fletcher*); Coimbatore, ii. and ix. 1912 (*T. B. Fletcher*); Nagpur, Central India, on white gourd (*Lagenaria vulgaris*), 14.viii.1909 (*Ratiram*); Dehra Dun, on grass, v. 1912 (*Prof. A. D. Imms*).

12. ***Chaetodacus maculipennis***, Dol. (1856).

*Bactrocera maculipennis*, Bezzi, Mem. Ind. Mus., iii, 1913, p. 99, pl. viii, fig. 11.

A very distinct species, which shows some affinity with the two preceding ones. It seems to be rare in India. The supernumerary anal lobe on the wings of the male is well developed.

Coimbatore, on cholan (*Andropogon sorghum*), 23.ix.1912 (*T. B. Fletcher*); Minbu, Lower Burma, on wild vine (*Vitis* sp.), 6-8.viii.1914 (*T. B. Fletcher*).

13. ***Chaetodacus hageni***, Meij. (1911).

*Dacus hageni*, De Meijere, Tijds. Entom., liv, 1911, p. 375.

This species, described and recorded hitherto only from Sumatra, agrees with the preceding one in having four scutellar bristles and a middle yellow stripe on the thorax, but differs in having only two pairs of lower fronto-orbital bristles, two rounded facial black spots, and the brown fore border of the wings dilated into a broad spot at the end of the third vein. The male (hitherto undescribed) is very like the female, but has the third abdominal segment ciliated, the supernumerary anal lobe not much developed but distinct, and the anal streak less broadened at the end; the fourth abdominal segment shows a rounded yellow spot in the black pattern on each side.

A single male from Meiktila, Upper Burma, on gourd (*Cucurbita* sp., 13-15.viii.-1914 (*T. B. Fletcher*).

14. ***Chaetodacus cucurbitae***, Coq. (1899).

*Bactrocera cucurbitae*, Bezzi, Mem. Ind. Mus., iii, 1913, p. 96, pl. viii, fig. 7.

*Dacus cucurbitae*, Lefroy, Indian Insect Life, 1909, p. 633, fig. 418.

This large and characteristic species is common in India and Burma, and very variable. The sexual characters in the male wing are well developed. The black facial spots are broad, ovate, and extended to the mouth-edge at their lower corner.

The following variations have been observed:—(a) *chaetotaxy*: sometimes only two pairs of orbital bristles; (b) *frontal pattern*: dark spots more or less developed, or even quite wanting; (c) *thoracic pattern*: thorax altogether reddish, or with black markings on the disk and the pleura; middle yellow stripe broad, narrow or even indistinct; (d) *abdominal pattern*: abdomen with none, or with one, or with two transverse black bands; (e) *femora*: entirely yellow or darkened at the end; (f) *wings*: anterior cross-vein not bordered with fuscous or with a narrow, or even with a broad border; posterior cross-vein broadly or narrowly bordered with fuscous.

Dehra Dun, on grass, vii, 1912 (*Prof. A. D. Imms*); Dhoni, Krishna Valley, 2,400 ft., 29-30.iv.1913; some old specimens in the Indian Museum from Poona and Calcutta; Pusa, Bihar, on parol (*Trichosanthes dioica*) in March, in *Cucumis* fruits in October, in *Momordica charantia* fruits in January, in pumpkin fruits (*Cucurbita* spp.) in December, in *Luffa aegyptiaca* fruits in February and in December

(*T. B. Fletcher*); Lyallpur, Punjab, on bitter gourd (*Momordica charantia*), 24.x.-1912 (*T. B. Fletcher*); Coimbatore, on melon and pumpkin (*Cucurbita melo*, *C. pepo*), and on cucumbers (*Cucumis*) (*T. B. Fletcher*); Nagpur, Central India, in cucurbit and in melon, v-vii.1910 (*Ratiram*); Taru, Peshawar Distr., larva in *Momordica charantia* (*T. B. Fletcher*); Meiktila, Upper Burma, on gourd (*Cucurbita pepo*), 13-15.viii.1914, Mandalay, on musk melon and on bitter gourd, 23.iv.1909, Pyinmana, on wild cucurbit, 7-9.ix.1914, Tatkon, on cucurbit, 6-7.ix.1914 (*T. B. Fletcher*), and many specimens from the last-named locality in fruits of *Trichosanthes cucumerina*, 20.ix.1914 (*K. D. Shroff*). All the specimens bred from fruits of *Luffa aegyptiaca* have the hind cross-vein very narrowly margined with fuscous.

15. ***Chaetodacus caudatus***, F. (1805).

*Bactrocera caudata*, Bezzi, Mem. Ind. Mus., iii, 1913, p. 97, pl. viii, fig. 8.

A large species, and very distinct, owing to its four scutellar bristles, three pairs of lower fronto-orbital bristles and peculiar wing pattern. In the Indian specimens the wings have the hind cross-vein always in the condition described by Hendl for his var. *nubilus*; I have never seen specimens with that cross-vein entirely margined with fuscous, and I think that Wiedemann has mixed up the present species with the preceding one.

Dehra Dun, on grass, 16.v.1912 (*Prof. A. D. Imms*); Shevaroy Hills, 5,000 ft., 14-22.x.1912 (*T. B. Fletcher*); Coimbatore, on skaki gourd, 29.x.1908; Bababudin Hills, Mysore, 4-5000 ft., 2-12.xi.1912, a specimen with the femora broadly black at the end (*T. B. Fletcher*); Lashio, 3,000 ft., and Tatkon, Upper Burma, the larva in fruits of *Trichosanthes palmata*, viii-ix.1914, Myitkyina, on pomelo (*Citrus decumana*) 30.viii.1914, Taung-gyi, Southern Shan States, 4,000 ft., 1.iii.1910 (*T. B. Fletcher* and *K. D. Shroff*).

16. ***Chaetodacus garciniae***, Bezzi (1913).

*Bactrocera garciniae*, Bezzi, Mem. Ind. Mus., iii, 1913, p. 97, pl. viii, fig. 9.

I have now seen other specimens of this species, bred at Peradenya, Ceylon, from *Garcinia* fruits (*E. E. Green*).

This species has an isolated position in the present genus, and forms a link with the genus *Mellesis* owing to the face not being hollowed and the lack of the usual sexual dimorphism in the structure of the wing.

17. ***Chaetodacus scutellarius***, sp. nov.

A very distinct species, strongly recalling *maculipennis*, Dol., but at once distinguished by the scutellum bearing only the apical pair of bristles and a well defined black spot at the end.

♀. Length of body (with the ovipositor), 6 mm.

Occiput shining black, with a broad yellow border, which is not dilated below; frons pale yellowish, white-dusted, darkened on the middle band but without a definite central spot, with three pairs of dark brown dots at the sides, the apical one of which is united with the dark lunula to form a transverse band above the root of antennae; ocellar spot shining black, and in contact with a black spot on each side, thus forming a transverse black band on the vertex; face pale yellow, shining, with



two oval black spots placed very low, in contact with the oral border; subocular dark spot distinct, but less defined; palpi and antennae yellow, the latter with the third joint darkened at the end; all the bristles are black, and there are three pairs of lower orbitals. Thorax entirely black, punctulate, grey pollinose on the back, with black bristles; middle scapular very thin, the outer strong; there is *no trace of an anterior supra-alar bristle*, but of this important point I am not sure, the specimen being unique; praescutellar well developed; pteropleural thin. The thorax shows the following bright yellow markings:—the humeral calli; a broad, exactly triangular mesopleural stripe, which terminates in a straight line above at the notopleural suture, the sutural callus being black, and is not continued below on the sternopleura, which is entirely black, with only a dark brown spot above; two contiguous hypopleural spots; three yellow stripes on dorsum behind the suture, the middle a little narrower than the lateral ones, all abbreviated long before reaching the scutellum. Mesophragma entirely shining black. Scutellum yellow, with the base narrowly black; at the apex there is a well defined shining black spot, which is sufficiently broad to fill the space between the bristles and is pointed anteriorly in the middle, reaching the middle of the scutellum. Halteres pale yellow. Abdomen black, punctulate, with grey pubescence like the thorax; first and second segment with an equal transverse yellow band on the hind border; third and fourth each with a small semi-lunar spot at the hind border on each side of the middle line; on the fifth segment these two spots are dilated so as to make almost the entire segment yellow, with a black middle line and a black base; basal segment of the ovipositor flattened, broad, as long as the last abdominal segment, black, dark reddish along the middle; second segment yellowish red; venter black, with a reddish basal band. Legs with the front femora almost entirely black, yellow only at the base and at the extreme tip; middle femora also black, but a little more broadly yellow at the base; hind femora with more than the basal half whitish, the remainder black; tibiae blackish, but the middle ones broadly pale in the middle; intermediate tarsi yellow, the others dark, with the praetarsi whitish; coxae brown. Wings hyaline, with dark yellowish veins; fore border narrow, but complete, blackish, extending from the stigma over the end of the third vein, where it is a little dilated, but not in the form of a spot; first basal cell broadly darkened above the second; a small dark spot at the end of the fifth vein and lower end of the hind cross-vein; anal streak broad and dark; last section of the fourth vein a little curved at the base.

Type ♀, a single specimen (British Museum) from Goorghalli Estate, 800 ft., S. Mysore, 14-24.iii.1913 (*T. B. Fletcher*).

#### 18. *Chaetodacus biguttatus*, sp. nov.

An eminently characteristic species, distinguished from any other at present known by its scutellum being entirely black, with a small yellow spot on each side and bearing only the apical pair of bristles.

♂. Length of body, 5.5 mm.

Head with shining black occiput, which is margined with a rather narrow yellow border, which is arcuated below the vertical area and very little dilated below; frons pale yellow, but dark brown along the middle stripe and with three pairs of ill-defined dark spots at the sides; ocellar dot and lunula black; face shining yellow, with two

broad black spots on the lower half; subocular dark spot less distinct; antennae entirely yellow, the second joint with some short and one long bristly black hairs, the third joint rather short and a little attenuated towards the end; palpi yellow, much dilated at the end, the dilated part almost rounded; all the bristles black, three pairs of lower fronto-orbitals present, the two apical pairs being less approximated than usual. Thorax entirely black, punctulate, rather shining, chiefly on the pleura and breast; on the dorsum there is a greyish pubescence, which is longer than usual, and on the sides, humeri and pleura there are rather long and soft hairs of a pale yellowish colour; on the dorsum, seen from behind, there are two broad and distinct parallel stripes of grey dust, abbreviated behind, but not interrupted at the suture. All the bristles are black; middle scapular indistinct; anterior supra-alar and praescutellar well developed; pteropleural very thin. The yellow markings are rather small and as follows:—the humeral calli, but while in all the preceding species they are entirely yellow, in the present species they have a black border on the inner side; a very narrow streak on each side behind the suture; a narrow mesopleural stripe, not extended above because the sutural callus is quite black, and not prolonged on the sternopleura, which has only the upper border dark reddish brown; this mesopleural stripe is besides not dilated above on the notopleural suture, being almost of equal width throughout; two contiguous hypopleural spots. Mesophragma entirely black. Scutellum black, punctulate and pubescent like the dorsum, with a pair of strong, apical black bristles; the two yellow spots are very narrow, rounded, and placed on the extreme lateral angles, but decidedly dorsal; the inferior side of the scutellum is yellowish. Squamae pellucid, with a white fringe, halteres whitish yellow. Abdomen entirely black, punctulate and pubescent like the thorax, and with rather long pale hairs towards the base; first segment with a very narrow, linear, hardly distinct yellow hind border; second segment with a little broader yellow hind border, which is interrupted in the middle and does not reach the sides; fifth segment with a narrow yellow hind border, which is dilated above in the middle; venter and genitalia black; third segment with long black cilia at the sides. Legs with black coxae and trochanters; front femora almost entirely, the four posterior ones on the apical third, shining black; the four anterior tibiae yellow, hind tibiae black; all the praetarsi yellow, the four other joints more or less blackish; femora with rather long white hairs; middle tibiae with a black apical spur. Wings slightly yellowish hyaline, with blackish veins; no costal border, but the stigma black and the very narrow subcostal cell dark yellowish; a rather broad, isolated brown spot at the end of the third vein; a less distinct dark spot at the lower end of the hind cross-veins and at the apex of the fifth vein; anal cell altogether hyaline, no anal stripe and even the dark spot at the end of the anal vein rather small. Supernumerary anal lobe distinct, but less developed; last section of fourth vein curved at the base, but straight at the end.

Type ♂ (Indian Museum), a single specimen from Darjiling, 7,000 ft., 25.v.1910 (*Brunetti*).

19. ***Chaetodacus bipustulatus***, Bezzi (1914).

*Bactrocera bipustulata*, Bezzi, Bull. Ent. Res., v, 1914, p. 153.

Allied to the preceding species but differing in its four scutellar bristles, the very

different coloration of the scutellum, and the entirely unicolorous wings. The humeral yellow spot is broadly margined with black at fore end and on inner side. Originally described from Mysore (Type in British Museum), there is another specimen from the same locality. Another male specimen in the Indian Museum from Coonoor, 6,000 ft., Nilgiris, vi. 1912 (*Capt. Sewell*).

20. ***Chaetodacus scutellaris*, Bezzi (1913).**

*Bactrocera scutellaris*, Bezzi, Mem. Ind. Mus., iii, 1913, p. 98, pl. viii, fig. 10.

Allied to the two preceding species, but easily distinguished by the different coloration of the scutellum, by the middle postsutural yellow stripe on the thorax, and by the well developed anal brown streak on the wings. In the present species the yellow spot on the humeral calli is only margined with light brown (not black) at the inner fore corner.

Two females in the Indian Museum from Almora, 5,500 ft., Kumaon, xi. 1912 (*C. Paiva*); Taung-gyi, S. Shan States, 4,000 ft., i. iii. 1910 (*K. D. Shroff*).

*Note.* It is interesting to see that, while in the Ethiopian fauna there is the unique *D. mesomelas*, Bezzi, from Congo and Ashanti, with a defined black pattern on the scutellum, in the Oriental fauna on the other hand there are so many species with patterned scutellum. Those known to me may be distinguished as follows :—

- 1 (8). Only two scutellar bristles.
- 2 (5). Only two pairs of lower fronto-orbital bristles; cephalic and thoracic bristles yellow; scutellar pattern less defined.
- 3 (4). Thorax in greater part black; scutellum with a darkish spot at the end; wings with anal brown stripe . . . . . *incisus*, Walk.
- 4 (3). Thorax in greater part reddish; scutellum with two yellow spots; wings without anal stripe . . . . . *versicolor*, n.
- 5 (2). Three pairs of lower fronto-orbital bristles; bristles black; scutellar pattern well defined.
- 6 (7). Scutellum yellow, with a black apical spot . . . . . *scutellarius*, n.
- 7 (6). Scutellum black, with a small yellow spot on each side at base  
*biguttatus*, n.
- 8 (1). Four scutellar bristles.
- 9 (12). Two pairs of lower fronto-orbital bristles.
- 10 (11). Scutellum black, with two broad yellow spots; wings without brown markings . . . . . *bipustulatus*, Bezzi.
- 11 (10). Scutellum yellow, with a black spot at the end; wings with a brown fore border, which is not dilated at the end . . . . . *scutellinus*, n.
- 12 (9). Three pairs of lower fronto-orbital bristles.
- 13 (14). Wings with an isolated brown spot at the end of the third longitudinal vein; mainly black species, with black ovipositor and less developed middle yellow stripe on thorax . . . . . *scutellaris*, Bezzi.
- 14 (13). The spot at end of the third vein is united with the brown fore border; ovipositor yellow.

15 (16). Yellow thoracic stripes less developed ; black scutellar spot margined with red ; brown fore border of wings not much dilated at end ; abdomen of male with a complete basal black cross-band on third and fourth segment

*sp. nov.* (not named).

16 (15). Yellow thoracic stripes very broad and striking ; black scutellar spot not margined with red ; brown fore border dilated into a spot at end ; abdomen of male only with a black spot on each side on the third and fourth segment

*scutellatus*, Hend.

*C. scutellinus* is a previously undescribed species from the Philippines, collected by Prof. C. F. Baker ; the unnamed new species is from Japan (*Dr. Miyake*), but I have received it also from South China, Foochow (*Gardner*).

#### iv. MELLESIS, gen. nov.

In erecting my new genus *Monacrostichus*,\* I provisionally comprised in it, besides the type species, the Oriental and Australian species *sepedonoides*, *aequalis*, *longicornis* (*vespoides*) and *conopoides* ; subsequently I described *M. crabroniformis* from India.†

At present I have before me very numerous species, which agree with *Monacrostichus* in having a stalked abdomen, a reduced thoracic chaetotaxy and elongate antennae ; but they are different in having no acrostichals, an interrupted suture, non-spinose front femora and the second section of the fourth longitudinal vein not sinuous. I now therefore think it is better to restrict the genus *Monacrostichus* to its type species *citricola*, and to erect for the other species a new genus, to which may be given the name of *Mellesis* (from the Greek *melleis* = *delay*), in allusion to the fact that it is still to be decided which of the above-named species belong to it or not, and what is to be considered its relation to the genus *Callantra*. *Monacrostichus crabroniformis*, Bezzi (1914), is to be treated as the type of the genus *Mellesis*.

The new genus differs from *Chaetodacus* as follows :—First antennal joint as long as the second, the antennae being much longer than the face. No praescutellar bristles ; anterior supra-alar bristles usually present, but sometimes wanting. Abdomen club-shaped. Wings without the supernumerary anal lobe in the male.

The known species are rather uniform in facies and wing pattern ; they have a wasp-like appearance and seem to mimic certain Hymenoptera of the groups CRABRONINAE or EUMENIDAE. The species known to me may be tabulated as follows :

1 (4). No anterior supra-alar bristle ; abdomen less stalked, being constricted only at base ; fronto-orbital bristles well developed ; face yellow, with a black stripe in each antennal groove, which reaches below the mouth border ; hypopleural spot double ; wings rather broad, with the second basal cell rather short.

2 (3). Frons broader than an eye, with only two pairs of lower fronto-orbital bristles ; antennae much longer than the face, with the two basal joints elongated ; wings yellowish, with a broad, rounded, apical blackish spot

*sphaeroidalis*, *sp. nov.*

\* Philippine Journal of Science, viii, 1913, p. 322.

† Bull. Entom. Res., v, 1914, p. 153.



3 (2). Frons narrower than an eye, with three pairs of lower fronto-orbitals; antennae not much longer than the face, with the two basal joints short; wings hyaline, with a broad apical grey and brown spot . . . . *brachycera*, sp. nov.

4 (1). Anterior supra-alar bristle well developed; abdomen properly stalked; face without black stripes in the antennal grooves; second basal cell long.

5 (6). Face entirely black; thorax with a single hypopleural spot and with a distinct yellow sutural stripe; anterior supra-alar bristle weak; wings with a dark fore border; smaller species . . . . . *crabroniformis*, Bezzi.

6 (5). Face yellow, with or without more or less developed black spots or bands; anterior supra-alar bristles strong.

7 (10). No distinct lower fronto-orbital bristles; a single hypopleural spot; face almost immaculate; frons with a brown middle cross-band; femora reddish; wings narrow, with the second basal cell much longer than broad and with an even brownish-yellow fore border extending to the third vein but not dilated at the end; size larger.

8 (9). Apical spot of the marginal cell entirely brown; yellow markings on thorax and scutellum well developed; ovipositor conical . . . . *destillatoria*, sp. nov.

9 (8). Apical spot of the marginal cell hyaline towards the middle; yellow markings less distinct; ovipositor flattened . . . . . *eumenoides*, sp. nov.

10 (7). Two pairs of well developed lower fronto-orbitals; hypopleural spot double; face with black spots or black band; frons not banded, only with a middle brown spot; femora in part black; second basal cell less elongate; size smaller.

11 (12). Face with a black transverse band; thorax on dorsum and pleura mainly black; all the femora in greater part black; wings with the black fore border narrow, almost undilated at end . . . . . *pedunculata*, sp. nov.

12 (11). Face with two broad, ovate black spots; thorax in great part reddish; the four posterior femora entirely yellowish; wings with the dark fore border dilated into a broad rounded spot at end . . . . . *nummularia*, sp. nov.

The last two species are from the Philippines (*Prof. C. F. Baker*), and will be described at another opportunity; all the remainder are from India or Burma.

## 21. *Mellesis sphaeroidalis*, sp. nov.

A very distinct species on account of the shape of its abdomen, the want of the anterior supra-alar bristle, and the wing coloration. The present and the next following species are not typical for the genus *Mellesis*, owing to their reduced chaetotaxy and not properly stalked abdomen, which is only constricted and depressed at the base, not at all in shape of a cylindrical thin stalk.

♂. Length of body, 10 mm.; length of antenna, 2 mm.

Head entirely reddish yellow; occiput rather shining, with a pale yellowish border near the eyes; ocellar dot small, black; frons very broad, distinctly broader than an eye, more dark towards the middle, and rather opaque; the orbital bristles are placed on small brown dots, one upper and only two lower pairs; lunula pale yellow, glistening; face pale yellow, shining, with a black stripe along each antennal groove, which below reaches the mouth-border, and above is prolonged in a thin point to the root of the antennae; cheeks narrow, yellow, rather opaque, like the jowls, which

have a brown spot below the lower corner of the eyes. Antennae much longer than the face, entirely yellow; first joint porrect, only a little shorter than the elongate second joint, which is pendulous like the third; third joint a little shorter than the first two together, slightly attenuated but obtuse at the end; the bare, very thin, yellow arista is inserted near the base and is as long as the last two joints together. Palpi broad, yellow, with very short pale hairs; proboscis dark brown, with yellowish pilose flaps. All the bristles of the head are black. Thorax entirely reddish, densely punctulate, with short yellowish pubescence, there are the following yellow markings: entire humeral callosities, but less bright than the other markings; sutural calli; a broad stripe on the mesopleura, which is broadly margined with black in front and is not continued on the sternopleura; two contiguous hypopleural spots. Suture broadly interrupted in the middle. Scutellum entirely yellow, with a narrow brown band at base; mesophragma reddish, without black markings. All the bristles are black; exterior scapulars long and strong, interior very thin, like yellow hairs; it seems that the anterior notopleural is wanting, like the anterior supra-alar; mesopleural thin; pteropleural indicated only by a yellowish hair; scutellum with only an apical pair of strong bristles. Halteres whitish. Abdomen club-shaped, rather narrow at base, but not in the shape of a cylindrical stalk; it is clothed with rather long whitish pubescence, which becomes yellowish and sericeous on the posterior segments, and is very long at the sides of the first two segments; it is punctulate like the thorax; first and second segment entirely reddish, the second with a broad yellow hind border; third segment with black cilia at the sides, dark red, with a broad black basal band, which does not reach the sides; fourth reddish, becoming yellowish towards the hind border; fifth red in the middle, black at the base, yellowish behind, with the two foveiform patches rather distinct. Venter reddish, pale yellowish before the end of the second sternite, the last two sternites with a broad black middle spot, the penultimate being smaller; genitalia small, reddish, retracted. Legs entirely reddish, but the basal half of the hind femora and all the tarsi (except the end) pale yellowish or whitish; the short pubescence is pale yellowish; the terminal spur of the middle tibiae is long and black. Wings with a yellowish tinge, which becomes more pronounced along the fore border above the third vein, but the second basal cell is almost hyaline and the alula is quite vitreous; no distinct supernumerary axillary lobe; the blackish brown spot is almost circular and extends from the end of the second vein to the upper corner of the discoidal cell and a little before the middle of the second posterior cell; the anal cell is distinctly yellow at the base and has a diffused dark spot at the end. Middle cross-vein very long and S-shaped; last section of third vein bent backwards before its middle; last section of fourth vein short and gently curved.

Type ♂ (British Museum) a single specimen from Dehra Dun, 16. vii. 1912, on grass (*Prof. A. D. Imms*).

## 22. *Mellesis brachycera*, sp. nov.

A rather aberrant species, apparently allied to the preceding, but distinguished from it and from all the others on account of the short basal joints of the antennae, which are shaped almost as in *Bactrocera*, while the chaetotaxy is that of *Dacus*, *s. str.*

♀. Length of body, 8 mm.

Head entirely reddish yellow ; occiput without a pale border around the eyes, or only with trace of an indistinct one at the lower part ; ocellar dot black ; frons narrower than an eye, much narrower than in the preceding species, with a less distinct dark spot in the middle or on the sides at the insertion of the orbital bristles ; three pairs of lower fronto-orbitals ; lunula small, shining reddish ; face, cheeks and jowls as in the preceding species, but the black stripes in the antennal grooves are shorter, reaching above only to the middle of the face ; there is a weak but distinct genal bristle, which is entirely wanting in *M. sphaeroidalis*. Antennae entirely yellow, only a little longer than the face, the two basal joints not being elongated and the first being much shorter than the second ; third joint elongate, with parallel sides, obtuse at end ; arista bare, thin, yellow, longer than the whole antenna. Palpi and proboscis as in the preceding. All the bristles of the head are black, like those of the thorax and scutellum ; in the case of the type there are two outer vertical bristles on the left side, the supernumerary one being as strong as the normal and closely approximated to it. Thorax as in the preceding species, but the humeral calli are more reddish than yellow, and behind the suture there is a blackish patch on each side, margined outwardly with a less defined yellowish stripe ; the suture is broadly interrupted in the middle and the sutural calli are reddish yellow ; mesopleural stripe reddish yellow, broadly margined with black in front, and shortly continued below on the upper part of the sternopleura, which is black (not reddish, as in *sphaeroidalis*) ; hypopleural spot double ; a small black spot above the hind coxae ; mesophragma with a broad black stripe on each side. Halteres and scutellum as in preceding, but this last is less bright yellow. Chaetotaxy as in *sphaeroidalis* ; middle scapular long and yellow, exterior black ; the anterior supra-alar is likewise wanting, but the anterior notopleural is as well developed as the posterior one. Abdomen elongate, not properly stalked, only narrowed near the base ; pubescence as long as in *sphaeroidalis* ; coloration also similar, but the second segment bears a transverse ovate black spot near the base, and the fourth and fifth have a black spot-like stripe on each side near the base. Venter yellow, with black middle spots on the hind half ; basal joint of ovipositor broad, in the shape of a trapezium, flattened, yellow, with long pubescence. Legs as in the preceding species, but the basal half of the middle femora is whitish. Wings hyaline, without yellow tinge ; fore border only pale brownish to the third vein ; apical spot as in the preceding, but of a grey colour, with two dark stripes along the third and fourth veins, the first being twice as broad as the second ; anal cell without dark stripe, only with a dark yellowish base ; small cross-vein straight.

Type ♀ (British Museum) a single specimen from Dehra Dun, Bhimtal Kumtal, 10.vi.1912 (*Prof. A. D. Imms*).

### 23. *Mellesis crabroniformis*, Bezzi (1914).

*Monacrostichus crabroniformis*, Bezzi, Bull. Ent. Res., v, 1914, p. 153.

A very characteristic species on account of its small size, entirely black face, weak anterior supra-alar bristle and single hypopleural spot. Originally described from Yerkaud, Shevaroy Hills, and not seen subsequently ; type in the British Museum.

(C288)



24. **Mellesis destillatoria**, sp. nov.

A species of greater size, and readily distinguished by the almost unspotted yellow face, well developed anterior supra-alar bristle, simple hypopleural spot, properly stalked abdomen and conical ovipositor.

♀. Length of body, 10 mm. ; length of antenna, 2.5 mm. ; length of ovipositor, 2 mm.

Head yellow ; occiput with a broad pale border behind the vertex and along the eye borders ; ocellar area broadly variegated with brown ; frons broad, distinctly broader than an eye, with a black cross-band in the middle, prolonged behind into a point on each side ; lunula shining black above ; a fuscous ill-defined stripe on the dividing line between the frons and cheeks ; face broad, rather shining, with uncertain fuscous spots above, below the root of the antennae and on the inner border of the antennal furrows behind the middle : a narrow black border at the upper mouth-edge ; cheeks and jowls yellow, the latter with a black triangular spot under the eye ; genal bristle distinct ; fronto-orbital bristles wanting in the case of the type, but it seems that the single upper pair may be present, the lower pairs being entirely wanting. Antennae very elongate, much longer than the face, yellow, the third joint darkened and with whitish dusting ; first joint elongate, about as long as the second ; second joint dilated at the end, with some pale yellowish hairs above and a longer one near the middle ; third joint a little longer than the first two taken together, linear, a little broader before the end than near the base, obtuse ; arista thin, bare, dark yellowish, as long as the last two antennal joints. Palpi broad, yellow, black at base, bare ; proboscis black, with yellowish flaps and with long pale hairs. Thorax short, convex, punctulate, entirely of a reddish colour, with short greyish pubescence ; there is a narrow longitudinal black middle stripe, ending before the scutellum, and in front with a trace of a lateral black stripe on each side ; suture broadly interrupted in the middle, with a narrow yellow stripe on each side, which, becoming broader and passing over the sutural calli, encroaches on the mesopleura, ending a little beyond the upper border of the sternopleura ; this stripe is margined with black in front on the mesopleura ; sternopleura above and pteropleura entirely black ; humeral calli yellow, narrowly margined with brown in front ; a single hypopleural spot, the mesophragma being reddish, with a blackish stripe on each side, which is only narrowly paler on the upper border. Scutellum yellow, with a black basal band. All the bristles are black ; interior scapular black and as strong as the exterior ; anterior notopleural and anterior supra-alar both well developed ; pteropleural not distinct ; apical scutellar strong. Halteres whitish. Abdomen with the first segment constricted to form a thin cylindrical stalk, continued by the base of the second segment, which is broadened behind ; the other three segments form an almost spherical club, under the border of which projects the strong and swollen ovipositor, with a long and conical first segment ; the abdomen is punctulate like the thorax and has a whitish pubescence, which is longer at the sides and becomes sericeous and yellowish on the last two segments. First segment reddish yellow, with a brown spot above on the posterior half ; second dark reddish, with yellow fore angles and a broad pale yellowish hind border ; third blackish, with a complete reddish hind border ; fourth and fifth black, with a broad yellowish hind border, which is broadened towards the middle ; the shining oval patches of the



last segment are broad and placed obliquely; ovipositor reddish brown, with the second segment lighter; venter black, with yellow base. Legs entirely reddish brown, with whitish pubescence; the base of the four posterior femora and the four posterior praetarsi are pale yellowish; apical spur of middle tibiae long and black. Wings rather narrow, greyish hyaline, with a brown yellowish fore border, which surpasses a little the third longitudinal vein, and is darker brown in the part below this vein and in the apical part above the end of the second longitudinal vein. Along the anal cell there is a broad but faint pale yellowish streak. Small cross-vein straight; last sections of third and fourth longitudinal veins almost straight and parallel.

Type ♀ (author's collection), a single specimen from Bhamo, Burma, vii, 1886 (*L. Fea*); cotypes in the Museum Civico, Genova.

## 25. *Mellesis eumenoides*, sp. nov.

Nearly allied to the preceding species, and perhaps only a variety of it, but distinguished by the flattened ovipositor, well developed upper fronto-orbital bristles, and different pattern of body and wings.

♂ ♀. Length of body, 10 mm.; length of antenna, 2.5 mm.; length of ovipositor, 2 mm.

Head and its appendages as in *M. destillatoria*, but with the following differences. There is no complete blackish cross-band on the frons, but only a less distinct dark middle spot; the face is entirely reddish yellow, with only a small black spot on each side near the upper end of the antennal furrows; mouth-edges without a black border; upper pair of fronto-orbital bristles thin but distinct, but the three lower pairs seem to be deciduous, being wanting or represented only by hairs. Thorax and scutellum as in *destillatoria*, but the yellow markings are much less distinct, being of a reddish colour, only a little paler than the colour of the surrounding parts. Abdomen shaped, coloured and clothed as in *destillatoria*; third segment of male with well developed black cilia, the genitalia in the same sex black, retracted; ovipositor with the basal segment flattened and black below, the second segment yellowish. Legs paler than in the preceding species. Wings with the same pattern and the same neuration; but in the brown end of the submarginal cell there is a hyaline streak, which is wholly wanting in *destillatoria*.

Type ♂ and ♀ (British Museum) and another male specimen from Takton, Upper Burma, 6-7.ix.1914, bred from fruits of *Trichosanthes cucumerina*, excl. 20-21.ix.1914 (*K. D. Shroff*). An additional male specimen from Myitkyina, Upper Burma, excl. ix.1914, from cucumber (*T. B. Fletcher*).

The puparium of the present species is of a pale whitish yellow colour, opaque, with less marked segmentation; posterior spiracles approximated, on a rounded blackish area.

## v. MONACROSTICHUS, Bezzi (1913).

As stated above, this genus is now restricted to its type species *M. citricola*, because I do not know if the species attributed to it in the Philippine Journal of Science belong in reality to it, or to *Mellesis*, or to some other genera. To the characters of the genus must be added that the thoracic suture is complete, thus indicating perhaps affinity with the genera *Adrama* and *Meracanthomyia*. Lower fronto-orbital bristles

entirely wanting, thus showing relation with *Mellesis destillatoria*. Second basal cell much longer than broad, thus showing remoteness from *Chaetodacus* and *Dacus* (*s. str.*).

vi. *CALLANTRA*, Walker (1860).

This genus is unknown to me; Hendel\* has it (as *Calantra*) among those with unarmed femora. It is very probable that this genus may coincide with one or the other of the two preceding genera; but Walker says: "Antennae long, seated on a common petiole or first joint, with which the succeeding part forms a right angle." Until it is proved that this is an error of observation, we must consider the genus as a distinct one. The type species, *C. smicroides* (*smieroides*) is from Makassar.

vii. *NEOSOPHIRA*, Hendel (1914).

This genus also has not yet been found in India. It has the general facies of *Adrama*, but is distinguished by the interrupted thoracic suture and by the unarmed femora. This and the two following genera belong to a special tribe, which is very different from the true DACINAE, as is to be seen from the narrow elongate body, the plumose arista, the elongate and triangular scutellum, the elongate and thickened middle femora, the narrow second basal cell and the short point of the anal cell. The two following genera have besides a complete, uninterrupted thoracic suture and spinose femora.

viii. *ADRAMA*, Walker (1859).

This genus is of economic importance, one of the species being the so-called tea-seed fly (*A. determinata*, Walk.), which, as observed in West Java, has done much damage in destroying tea-seeds (*Meded. v. h. Proefstation voor Thee*, xxxv, March 1915). Three species are at present known, only the following being Indian.

26. ***Adrama austeni***, Hendel (1912).†

Very near *A. determinata*, but distinguished by the black occiput and by the much narrower apical dark spot of the wings.

Originally described from Ceylon, I have seen a male specimen collected at Peradeniya, by Prof. Buguion.

ix. *MERACANTHOMYIA*, Hendel (1910).

Very near the preceding genus, but differing in the very elongate antennae, which are shaped as in *Monacrostichus*, in the compressed, not depressed, ovipositor, the short face, the produced mouth-border, and in the middle femora being spinose for their whole length. Two Indian species of the present genus are known: *M. maculipennis*, Macquart (1851), from East India, and *M. gamma*, Hendel (*Wien. ent. Zeit.*, xxix, 1910, p. 107, pl. 1, fig. 13) from Ceylon. A third species, *M. antennata*, Hendel (*Wien. entom. Zeit.*, xxxi, 1912, p. 11) from Ashanti, West Africa, is the unique representative of the present tribe in the Ethiopian region.

\**Wien. Ent. Zeit.*, xxxiii., 1914, p. 74.

†*Wien. Ent. Zeit.*, xxxi, p. 12.

## INDEX OF PLANTS, WITH THE SPECIES FEEDING ON THEM.

<i>Achras sapota</i>	..	..	..	Chaetodacus ferrugineus versicolor, C. zonatus.
<i>Aegle marmelos</i>	..	..	..	Chaetodacus zonatus.
<i>Andropogon sorghum</i>	..	..	..	Chaetodacus maculipennis.
<i>Artocarpus integrifolia</i>	..	..	..	Chaetodacus ferrugineus incisus.
<i>Calotropis procera</i>	..	..	..	Dacus longistylus.
<i>Capsicum frutescens</i>	..	..	..	Chaetodacus ferrugineus dorsalis.
<i>Careya arborea</i>	..	..	..	Chaetodacus ferrugineus incisus, C. zonatus.
<i>Citrus aurantium</i>	..	..	..	Chaetodacus diversus.
<i>Citrus decumana</i>	..	..	..	Chaetodacus ferrugineus, C. ferrugineus dorsalis, C. caudatus.
<i>Citrus sp.</i>	..	..	..	Monacrostichus citricola.
<i>Cucumis sp.</i>	..	..	..	Chaetodacus cucurbitae.
<i>Cucurbita melo</i>	..	..	..	Dacus brevistylus, Chaetodacus cucurbitae.
<i>Cucurbita pepo</i>	..	..	..	Chaetodacus cucurbitae.
<i>Cucurbita sp.</i>	..	..	..	Chaetodacus hageni, C. cucurbitae, C. caudatus.
<i>Eriobothrya japonica</i>	..	..	..	Chaetodacus ferrugineus, C. ferrugineus dorsalis.
<i>Ficus sp.</i>	..	..	..	Chaetodacus zonatus.
<i>Garcinia sp.</i>	..	..	..	Chaetodacus garciniae.
<i>Lagenaria vulgaris</i>	..	..	..	Chaetodacus zonatus, C. diversus.
<i>Luffa aegyptiaca</i>	..	..	..	Chaetodacus cucurbitae.
<i>Mangifera indica</i>	..	..	..	Chaetodacus ferrugineus, C. ferrugineus dorsalis, C. ferrugineus incisus C. ferrugineus versicolor, C. zonatus, C. correctus.
<i>Momordica charantia</i>	..	..	..	Chaetodacus cucurbitae.
<i>Prunus persica</i>	..	..	..	Chaetodacus ferrugineus, C. ferrugineus dorsalis, C. zonatus, C. tuberculatus, C. correctus, C. duplicatus.
<i>Psidium guyava</i>	..	..	..	Chaetodacus ferrugineus, C. ferrugineus dorsalis, C. ferrugineus incisus, C. ferrugineus versicolor.
<i>Pyrus communis</i>	..	..	..	Chaetodacus ferrugineus dorsalis.
<i>Solanum verbascifolium</i>	..	..	..	Chaetodacus ferrugineus dorsalis, C. ferrugineus incisus.
<i>Thea sp.</i>	..	..	..	Adrama determinata.
<i>Trichosanthes cucumerina</i>	..	..	..	Chaetodacus cucurbitae, Mellesis eumenoides.
<i>Trichosanthes dioica</i>	..	..	..	Chaetodacus cucurbitae.
<i>Trichosanthes palmata</i>	..	..	..	Chaetodacus caudatus.
<i>Vitis sp.</i>	..	..	..	Chaetodacus maculipennis.

*Note.*—From the above enumeration it will be seen that the forms of *C. ferrugineus* and its allies breed on various plants of different families, but never on Cucurbitaceae ; while *C. cucurbitae* and its allies feed only on plants of that family. The polyphagous species, like *C. ferrugineus* (*s. l.*) and *C. cucurbitae*, are very variable in their characters. Only species or forms of the *ferrugineus*-group are attracted by oil of citronella.